Electronic Supplementary Material (ESI) for Energy & Environmental Science.

Supplementary Information for
Calculations of Theoretical Efficiencies for Electrochemically-Mediated Tandem Solar Water Splitting as a Function of Bandgap Energies and Redox Shuttle Potential

Sam Keene,[a] Rohini Bala Chandran,[b] and Shane Ardo[c,d*]

[a] Department of Physics, University of California Irvine, Irvine, CA 92697-2025 USA

[b] Department of Mechanical Engineering, University of Michigan, Ann Arbor, MI 48109-2125 USA

[c] Department of Chemistry, University of California Irvine, Irvine, CA 92697-2025 USA

[d] Department of Chemical Engineering and Materials Science, University of California Irvine, Irvine, CA 92697-2025 USA

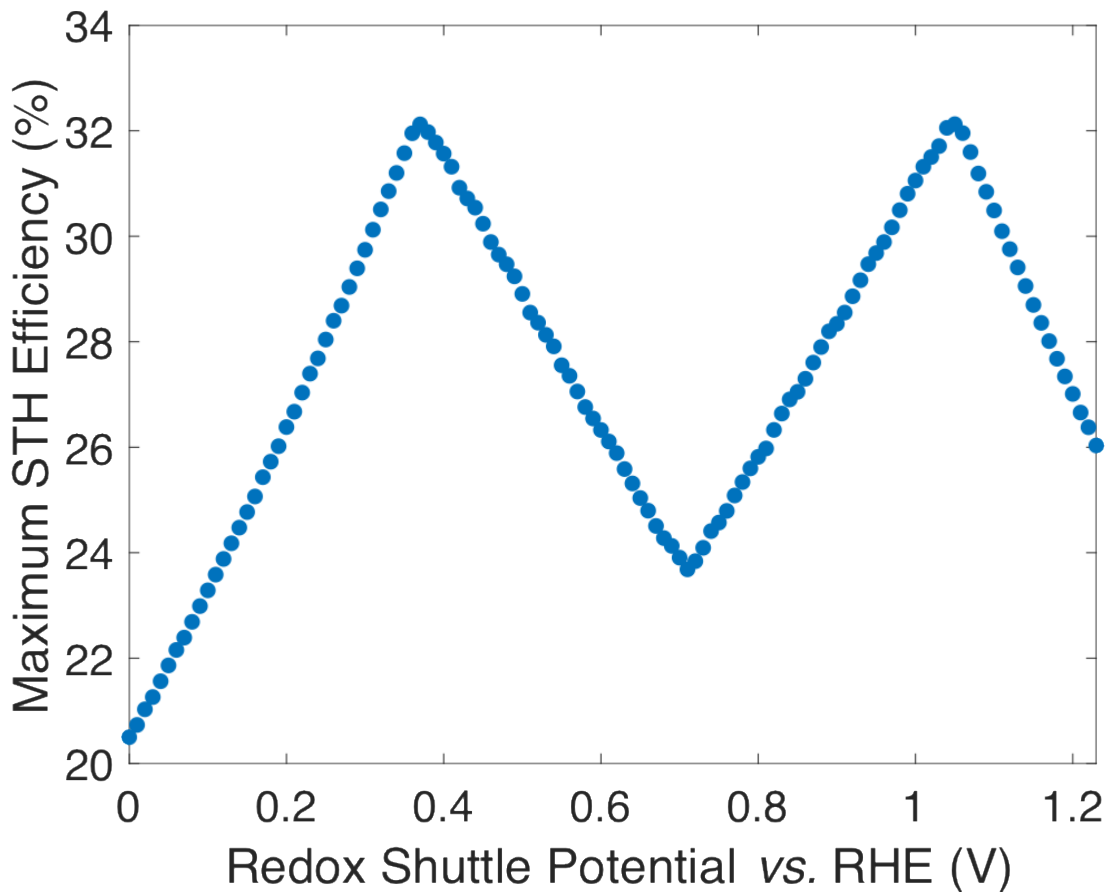

Figure S1. Maximum STH efficiency *vs.* $E_{shuttle}$ assuming ideal electrocatalytic parameters and using an incident spectrum of a blackbody at 5800 K instead of the solar spectrum.

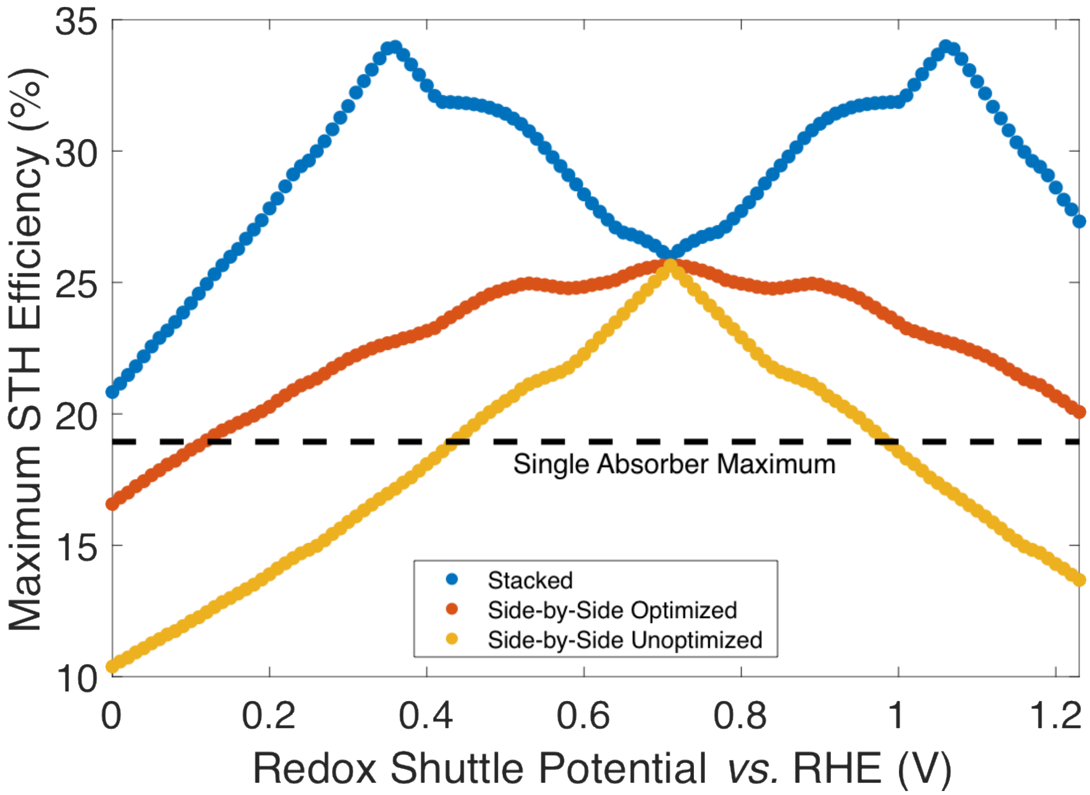

Figure S2. Maximum STH efficiency *vs.* $E_{shuttle}$ assuming ideal electrocatalytic parameters for a stacked tandem design, a side-by-side tandem design with the relative area of the two light-absorbers optimized, and a side-by-side tandem design with an equal (unoptimized) relative area of the two light-absorbers.

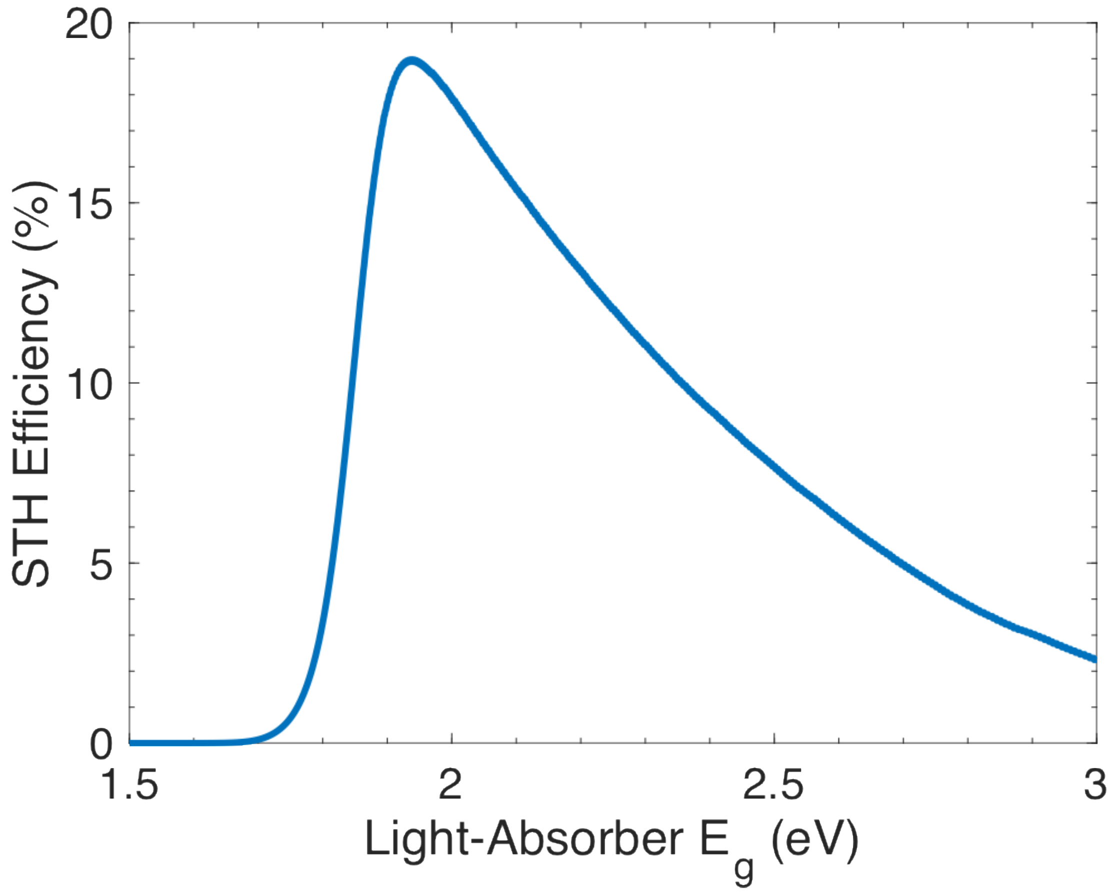

Figure S3. STH efficiency *vs*. light-absorber bandgap for the design in which a single light-absorber drives the OER and the HER (i.e. overall water electrolysis).

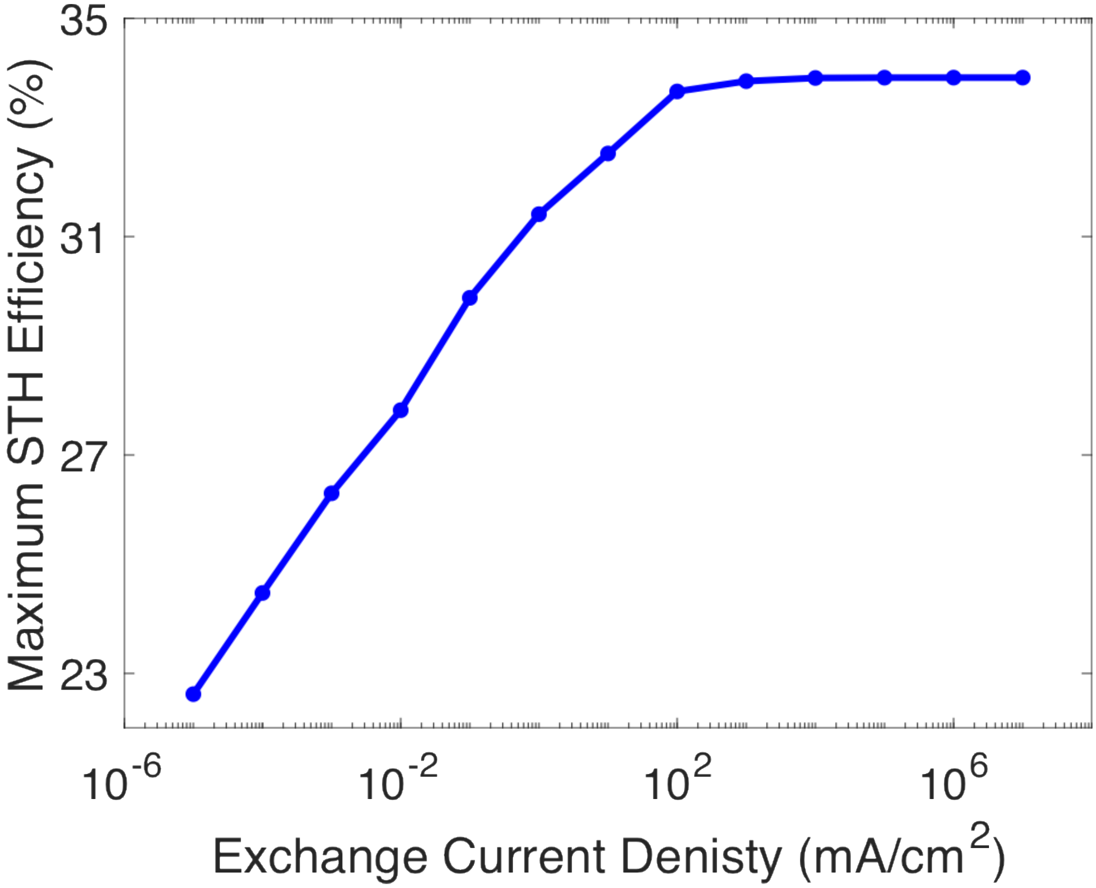

Figure S4. Global maximum STH efficiency *vs.* exchange current density for the redox shuttle reactions.